

**Amendments to the Claims**

This listing of claims replaces all prior versions, and listings, of claims in the above-identified application:

**Listing of Claims**

**1-50. Cancelled**

**51. (Original)** A planarization method comprising:

positioning a metal-containing surface of a substrate to interface with a polishing surface, wherein the metal-containing surface comprises a metal selected from the group consisting of a Group VIIB metal, a Group IB metal, and a combination thereof;  
supplying a planarization composition in proximity to the interface; and  
planarizing the substrate surface;

wherein the planarization composition comprises a halogen-containing compound and a halide salt, with the proviso that the planarization composition does not include abrasive particles.

**52. (Original)** The method of claim 51 wherein the metal-containing surface of the substrate comprises a metal selected from the group consisting of a Group VIIB metal, a Group IB metal, and a combination thereof, which is in elemental form or an alloy thereof.

**53. (Original)** The method of claim 51 wherein the metal-containing surface of the substrate comprises a metal selected from the group consisting of a Group VIIB second row metal, a Group VIIB third row metal, a Group IB second row metal, a Group IB third row metal, and a combination thereof.

Applicant(s): Brian A. Vaartstra

Serial No. Unknown (Parent Serial No. 10/032,049)

Filed: Herewith (Parent: December 21, 2001)

For: METHODS FOR PLANARIZATION OF METAL-CONTAINING SURFACES USING HALOGENS AND HALIDE SALTS

---

54. **(Original)** The method of claim 53 wherein the metal-containing surface of the substrate comprises a metal selected from the group consisting of Rh, Pd, Pt, Ir, and Ru.
55. **(Original)** The method of claim 54 wherein the metal-containing surface comprises elemental platinum.
56. **(Original)** The method of claim 51 wherein the metal is present in an amount of about 50 atomic percent or more.
57. **(Original)** The method of claim 51 wherein the substrate is a semiconductor substrate or substrate assembly.
58. **(Original)** The method of claim 51 which is carried out in one step.
59. **(Original)** The method of claim 51 wherein the halogen-containing compound is selected from the group consisting of a halogen, an interhalogen, a halogen-generating compound, and combinations thereof.
60. **(Original)** The method of claim 51 wherein the halogen-containing compound is selected from the group consisting of a halogen; an interhalogen; a halogen-generating compound selected from the group consisting of  $\text{XeF}_2$ ,  $\text{HgF}_2$ ,  $\text{SF}_4$ , alkyl halides, and complexes of halogen with organic bases; and combinations thereof.
61. **(Original)** The method of claim 51 wherein the halogen-containing compound is selected from the group consisting of  $\text{F}_2$ ,  $\text{Cl}_2$ ,  $\text{Br}_2$ ,  $\text{I}_2$ ,  $\text{ClBr}$ ,  $\text{IBr}$ ,  $\text{ICl}$ ,  $\text{BrF}$ ,  $\text{ClF}$ ,  $\text{ClF}_3$ ,  $\text{BrF}_3$ ,  $\text{ClF}_5$ ,  $\text{IF}_3$ ,  $\text{IF}_7$ ,  $\text{XeF}_2$ ,  $\text{HgF}_2$ ,  $\text{SF}_4$ , alkyl halides, and complexes of halogen with organic bases, and combinations thereof.

Applicant(s): Brian A. Vaartstra

Serial No. Unknown (Parent Serial No. 10/032,049)

Filed: Herewith (Parent: December 21, 2001)

For: METHODS FOR PLANARIZATION OF METAL-CONTAINING SURFACES USING HALOGENS AND HALIDE SALTS

---

62. **(Original)** The method of claim 51 wherein the halogen-containing compound is selected from the group consisting of  $\text{ClBr}$ ,  $\text{IBr}$ ,  $\text{ICl}$ ,  $\text{BrF}$ ,  $\text{ClF}$ ,  $\text{ClF}_3$ ,  $\text{BrF}_3$ ,  $\text{ClF}_5$ ,  $\text{IF}_5$ ,  $\text{IF}_7$ ,  $\text{XeF}_2$ ,  $\text{HgF}_2$ ,  $\text{SF}_6$ , alkyl halides, and complexes of halogen with organic bases, and combinations thereof.
63. **(Original)** The method of claim 51 wherein the halide salt is an inorganic salt.
64. **(Original)** The method of claim 63 wherein the inorganic halide salt is selected from the group consisting of  $\text{NaI}$ ,  $\text{KCl}$ ,  $\text{KBr}$ ,  $\text{NH}_4\text{F}$ , and combinations thereof.
65. **(Original)** The method of claim 51 wherein the halide salt is an organic salt.
66. **(Original)** The method of claim 65 wherein the organic salt is selected from the group consisting of  $\text{Et}_4\text{NBr}$ ,  $\text{Me}_3\text{NHCl}$ ,  $\text{Me}_4\text{NF}$ , and combinations thereof.
67. **(Original)** The method of claim 51 wherein the halogen-containing compound is present in the planarization composition in an amount of at least about 0.1% by weight and the halide salt is present in the planarization composition in an amount of at least about 0.1% by weight.
68. **(Original)** The method of claim 51 wherein the halogen-containing compound is present in the planarization composition in an amount of about 1% to about 10% by weight.
69. **(Original)** The method of claim 51 wherein the halide salt is present in the planarization composition in an amount of about 1% to about 10% by weight.
70. **(Original)** The method of claim 51 wherein the halogen of the halogen-containing compound is different than the halogen of the halide salt.

**Preliminary Amendment**

Page 6 of 12

Applicant(s): Brian A. Vaarstra

Serial No. Unknown (Parent Serial No. 10/032,049)

Filed: Herewith (Parent: December 21, 2001)

For: METHODS FOR PLANARIZATION OF METAL-CONTAINING SURFACES USING HALOGENS AND HALIDE SALTS

---

71. **(Original)** The method of claim 51 wherein the planarization composition is not basic.
72. **(Original)** The method of claim 51 wherein the polishing surface comprises a fixed abrasive article.
73. **(Original)** A planarization method comprising:  
    providing a semiconductor substrate or substrate assembly including at least one region of a platinum-containing surface;  
    providing a polishing surface;  
    providing a planarization composition at an interface between the at least one region of platinum-containing surface and the polishing surface; and  
    planarizing the at least one region of platinum-containing surface;  
    wherein the planarization composition comprises a halogen-containing compound and a halide salt, with the proviso that the planarization composition does not include abrasive particles.
74. **(Original)** The method of claim 73 wherein the platinum-containing surface of the substrate comprises platinum in elemental form.
75. **(Original)** The method of claim 73 wherein the platinum is present in an amount of about 50 atomic percent or more.
76. **(Original)** The method of claim 73 wherein the semiconductor substrate or substrate assembly is a silicon wafer.

77. **(Original)** The method of claim 73 wherein the halogen-containing compound is selected from the group consisting of a halogen, an interhalogen, a halogen-generating compound, and combinations thereof.
78. **(Original)** The method of claim 73 wherein the halogen-containing compound is selected from the group consisting of a halogen; an interhalogen; a halogen-generating compound selected from the group consisting of  $\text{XeF}_2$ ,  $\text{HgF}_2$ ,  $\text{SF}_4$ , alkyl halides, and complexes of halogen with organic bases; and combinations thereof.
79. **(Original)** The method of claim 73 wherein the halogen-containing compound is selected from the group consisting of  $\text{F}_2$ ,  $\text{Cl}_2$ ,  $\text{Br}_2$ ,  $\text{I}_2$ ,  $\text{ClBr}$ ,  $\text{IBr}$ ,  $\text{ICl}$ ,  $\text{BrF}$ ,  $\text{ClF}$ ,  $\text{ClF}_3$ ,  $\text{BrF}_3$ ,  $\text{ClF}_5$ ,  $\text{IF}_5$ ,  $\text{IF}_7$ ,  $\text{XeF}_2$ ,  $\text{HgF}_2$ ,  $\text{SF}_4$ , alkyl halides, and complexes of halogen with organic bases, and combinations thereof.
80. **(Original)** The method of claim 73 wherein the halide salt is an inorganic salt.
81. **(Original)** The method of claim 80 wherein the inorganic halide salt is selected from the group consisting of  $\text{NaI}$ ,  $\text{KCl}$ ,  $\text{KBr}$ ,  $\text{NH}_4\text{F}$  and combinations thereof.
82. **(Original)** The method of claim 73 wherein the halide salt is an organic salt.
83. **(Original)** The method of claim 82 wherein the organic salt is selected from the group consisting of  $\text{Et}_4\text{NBr}$ ,  $\text{Me}_3\text{NHCl}$ ,  $\text{Me}_4\text{NF}$ , and combinations thereof.
84. **(Original)** The method of claim 73 wherein the halogen-containing compound is present in the planarization composition in an amount of at least about 0.1% by weight and the halide salt is present in the planarization composition in an amount of at least about 0.1% by weight.

85. **(Original)** The method of claim 73 wherein the halogen-containing compound is present in the planarization composition in an amount of about 1% to about 10% by weight.

86. **(Original)** The method of claim 73 wherein the halide salt is present in the planarization composition in an amount of about 1% to about 10% by weight.

87. **(Original)** The method of claim 73 wherein the polishing surface comprises a fixed abrasive article.

88. **(Original)** A planarization method for use in forming an interconnect, the method comprising:

- providing a semiconductor substrate or substrate assembly having a patterned dielectric layer formed thereon and a metal-containing layer formed over the patterned dielectric layer, wherein the metal-containing layer comprises a metal selected from the group consisting of a Group VIIIIB metal, a Group IB metal, and a combination thereof;

- positioning a first portion of a polishing surface for contact with the metal-containing layer;

- providing a planarization composition in proximity to the contact between the polishing surface and the metal-containing layer; and

- planarizing the metal-containing layer;

wherein the planarization composition comprises a halogen-containing compound and a halide salt, with the proviso that the planarization composition does not include abrasive particles.

89. **(Original)** The method of claim 88 wherein the halogen-containing compound is selected from the group consisting of a halogen, an interhalogen, a halogen-generating compound, and combinations thereof.

Applicant(s): Brian A. Vaartstra

Serial No. Unknown (Parent Serial No. 10/032,049)

Filed: Herewith (Parent: December 21, 2001)

For: METHODS FOR PLANARIZATION OF METAL-CONTAINING SURFACES USING HALOGENS AND HALIDE SALTS

---

90. **(Original)** The method of claim 88 wherein the halogen-containing compound is selected from the group consisting of a halogen; an interhalogen; a halogen-generating compound selected from the group consisting of  $\text{XeF}_2$ ,  $\text{HgF}_2$ ,  $\text{SF}_6$ , alkyl halides, and complexes of halogen with organic bases; and combinations thereof.
91. **(Original)** The method of claim 88 wherein the halogen-containing compound is selected from the group consisting of  $\text{F}_2$ ,  $\text{Cl}_2$ ,  $\text{Br}_2$ ,  $\text{I}_2$ ,  $\text{ClBr}$ ,  $\text{IBr}$ ,  $\text{ICl}$ ,  $\text{BrF}$ ,  $\text{ClF}$ ,  $\text{ClF}_3$ ,  $\text{BrF}_3$ ,  $\text{ClF}_5$ ,  $\text{IF}_5$ ,  $\text{IF}_7$ ,  $\text{XeF}_2$ ,  $\text{HgF}_2$ ,  $\text{SF}_6$ , alkyl halides, and complexes of halogen with organic bases, and combinations thereof.
92. **(Original)** The method of claim 88 wherein the halide salt is an inorganic salt.
93. **(Original)** The method of claim 92 wherein the inorganic halide salt is selected from the group consisting of  $\text{NaI}$ ,  $\text{KCl}$ ,  $\text{KBr}$ ,  $\text{NH}_4\text{F}$  and combinations thereof.
94. **(Original)** The method of claim 88 wherein the halide salt is an organic salt.
95. **(Original)** The method of claim 94 wherein the organic salt is selected from the group consisting of  $\text{Et}_4\text{NBr}$ ,  $\text{Me}_3\text{NHCl}$ ,  $\text{Me}_4\text{NF}$ , and combinations thereof.
96. **(Original)** The method of claim 88 wherein the halogen-containing compound is present in the planarization composition in an amount of at least about 0.1% by weight.
97. **(Original)** The method of claim 96 wherein the halogen-containing compound is present in the planarization composition in an amount of about 1% to about 10% by weight.

98. **(Original)** The method of claim 88 wherein the halide salt is present in the planarization composition in an amount of at least about 0.1% by weight.

99. **(Original)** The method of claim 98 wherein the halide salt is present in the planarization composition in an amount of about 1% to about 10% by weight.

100. **(Original)** The method of claim 88 wherein the polishing surface comprises a fixed abrasive article.

101. **(Original)** A planarization method comprising:

positioning a metal-containing surface of a substrate to interface with a polishing surface comprising a fixed abrasive article, wherein the metal-containing surface comprises a metal selected from the group consisting of a Group VIIIIB metal, a Group IB metal, and a combination thereof;

supplying a planarization composition in proximity to the interface; and

planarizing the substrate surface;

wherein the planarization composition comprises a halogen-containing compound and a halide salt.

102. **(Original)** A planarization method comprising:

providing a semiconductor substrate or substrate assembly including at least one region of a platinum-containing surface;

providing a polishing surface comprising a fixed abrasive article;

providing a planarization composition at an interface between the at least one region of platinum-containing surface and the polishing surface; and

planarizing the at least one region of platinum-containing surface;



wherein the planarization composition comprises a halogen-containing compound and a halide salt.

103. **(Original)** A planarization method for use in forming an interconnect, the method comprising:

providing a semiconductor substrate or substrate assembly having a patterned dielectric layer formed thereon and a metal-containing layer formed over the patterned dielectric layer, wherein the metal-containing layer comprises a metal selected from the group consisting of a Group VIIIIB metal, a Group IB metal, and a combination thereof;

positioning a first portion of a polishing surface comprising a fixed abrasive article for contact with the metal-containing layer;

providing a planarization composition in proximity to the contact between the polishing surface and the metal-containing layer; and

planarizing the metal-containing layer;

wherein the planarization composition comprises a halogen-containing compound and a halide salt.